MARINE ECOLOGY

For purposes of discussing and planning coral atoll research in marine biology the field may be divided into four categories, each highly significant when standing alone but inextricably associated with the others. These are (1) marine biology in relation to native welfare, (2) conservation of marine resources, (3) commercial exploitation of tropical Pacific marine resources, and (4) significant biological problems related to coral atolls.

The first, welfare of native populations, should hold the ranking position in planned investigations of coral atolls. High population densities, infertile soil for agricultural activities, absence of adequate natural resources, and lack of technical knowledge among indigent natives focus greater attention upon the renewable resources available in the marine environment. To this end information should be obtained on native uses of marine products as subsistence or food resources, as implement and decorative resources, and as export or income resources. With respect to subsistence or food resources the following major items must be considered: species used, catch statistics, analysis of marine food requirements per person, methods of collecting or fishing, means of preparation and preservation of marine products, use of marine organisms for fertilizer or as food for domestic animals, poisonous species, conservation practices, comparison of inhabited and uninhabited islets in regard to the abundance of desirable species, etc. With respect to income resources a broad survey of the abundance of exportable items should be made and then followed up with an economic appraisal of costs of production, available markets, and transportation problems.

From the standpoint of conservation the marine environments are in a healthy condition generally. However, should certain commercial activities ensue, there would be definite need for studies basic to conservation. We need not dwell long upon this subject as pertinent items are considered under other headings.

Commercial exploitation of marine resources is inevitable, indeed, a rather good start in this regard was made by the Japanese prior to 1941. Many problems arise which should be tackled ahead of extensive commercial developments while time is available to legislate conservation measures, rather than to follow with ineffective remedial action in the wake of overexploitation. Studies on the relation of atolls and other mid-oceanic islands to concentrations of tuna and tuna-like fishes, on baitfish species and their abundance in the lagoons of all atolls, on the biology and population characteristics of baitfish, methods of catching baitfish, and possible native participation in a baitfish fishery, on poisonous commercial fishes, on the abundance and biology of trochus and other shells of commercial importance, on the abundance and biology of spiny lobsters, etc.

Coral atolls in particular and the tropical Pacific in general are considered to be the finest natural laboratories for a legion of fundamental biological and oceanographic problems. Important among these are (1) the effect of atolls on the surrounding oceanic environment, from the standpoint of vertical

water movements, concentration of nutrient salts, biotic effects of the dispersal of larval forms produced by inshore or lagoon organisms, and phyto- and zooplankton production, (2) systematics and accompanying zoogeographic interpretations of the Indo-Pacific faunal complex, (3) effects of steady climatic conditions on annual or seasonal rhythms, (4) biology of corals, (5) landward progression of marine species via ocean beaches, (6) ecological aspects of coral reefs, (7) comparative studies on lagoon vs. oceanic plankton, etc.

The foregoing synopses provide a general idea of the nature of marine biological problems of importance to coral atoll research. Since time does not permit a full discussion of them all, those placed on the agenda are considered most timely and stand the best chance of success at the current time with present facilities. Stress should be placed on worthy problems for investigation, rather than on the detailed methods of accomplishing the task.

Agenda

Note: those marked with an asterisk can be accomplished by members of an atoll research team during summer periods.

Native welfare

*1. General inventory of useful species.
*2. Use of marine products for subsistence and income resources.
*3. Methods of collecting and fishing.

Commercial fishing

*1. Baitfish resources.
*2. Reef fish and shellfish resources.
3. Abundance of economically important pelagic fishes in the vicinity of atolls.

Biological problems

*1. Ecology of coral reefs.
*2. Systematics and zoogeography.
3. Animal rhythms in the tropics.
4. Effect of atolls on the oceanic environment.

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